No. 743,587. PATENTED NOV. 10, 1903

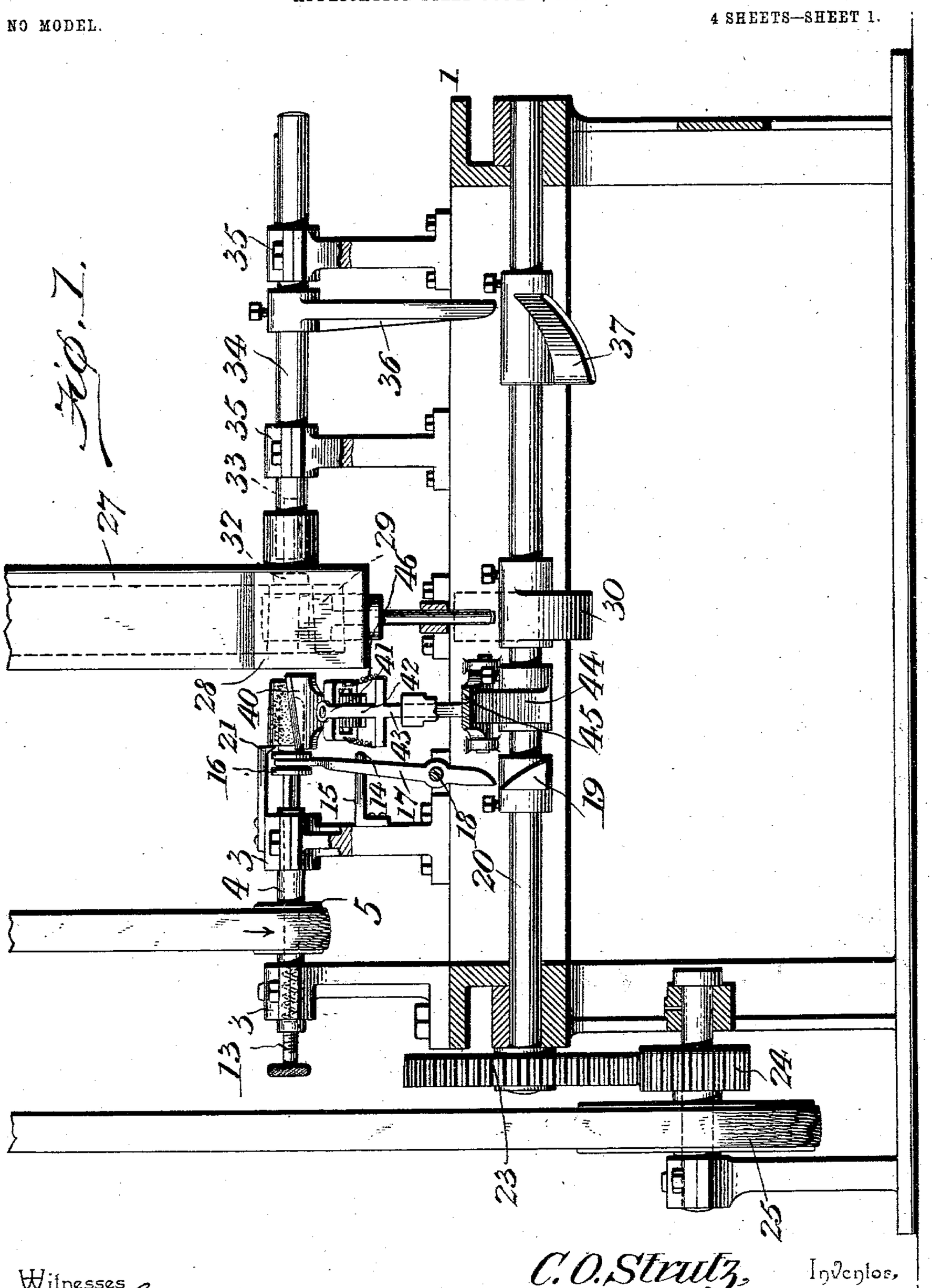
C. O. STRUTZ.

MACHINE FOR TURNING CORNCOB PIPES.

APPLICATION FILED JUNE 5, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

Fig. 1.



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NO MODEL. 4 SHEETS—SHEET 2.

FIG. 2.

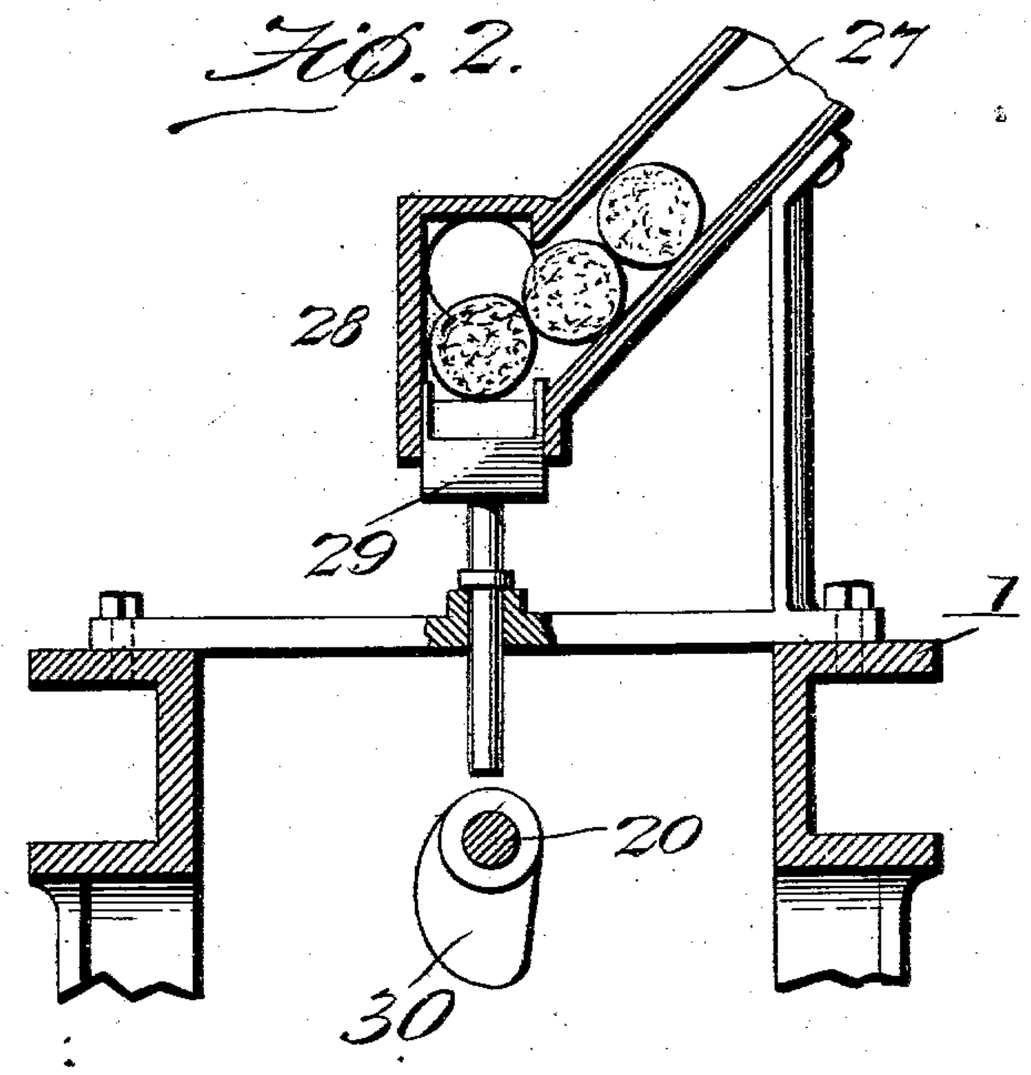


FIG. 5.

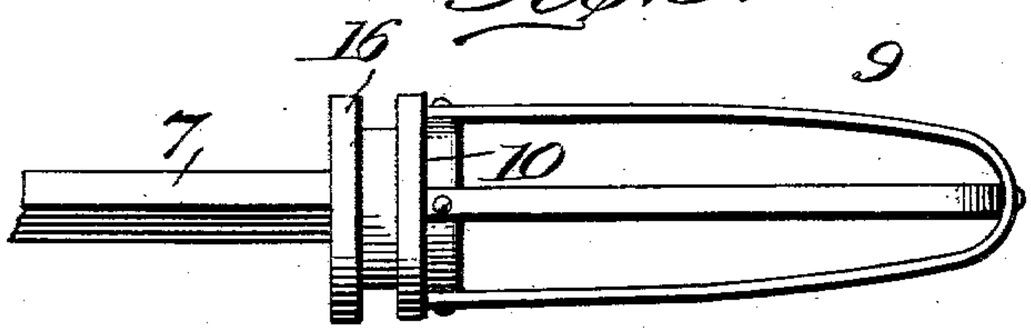
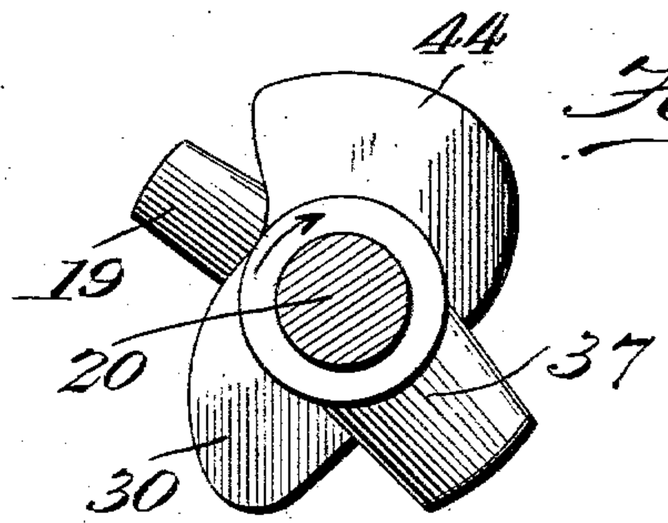


FIG. 6.



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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 3.

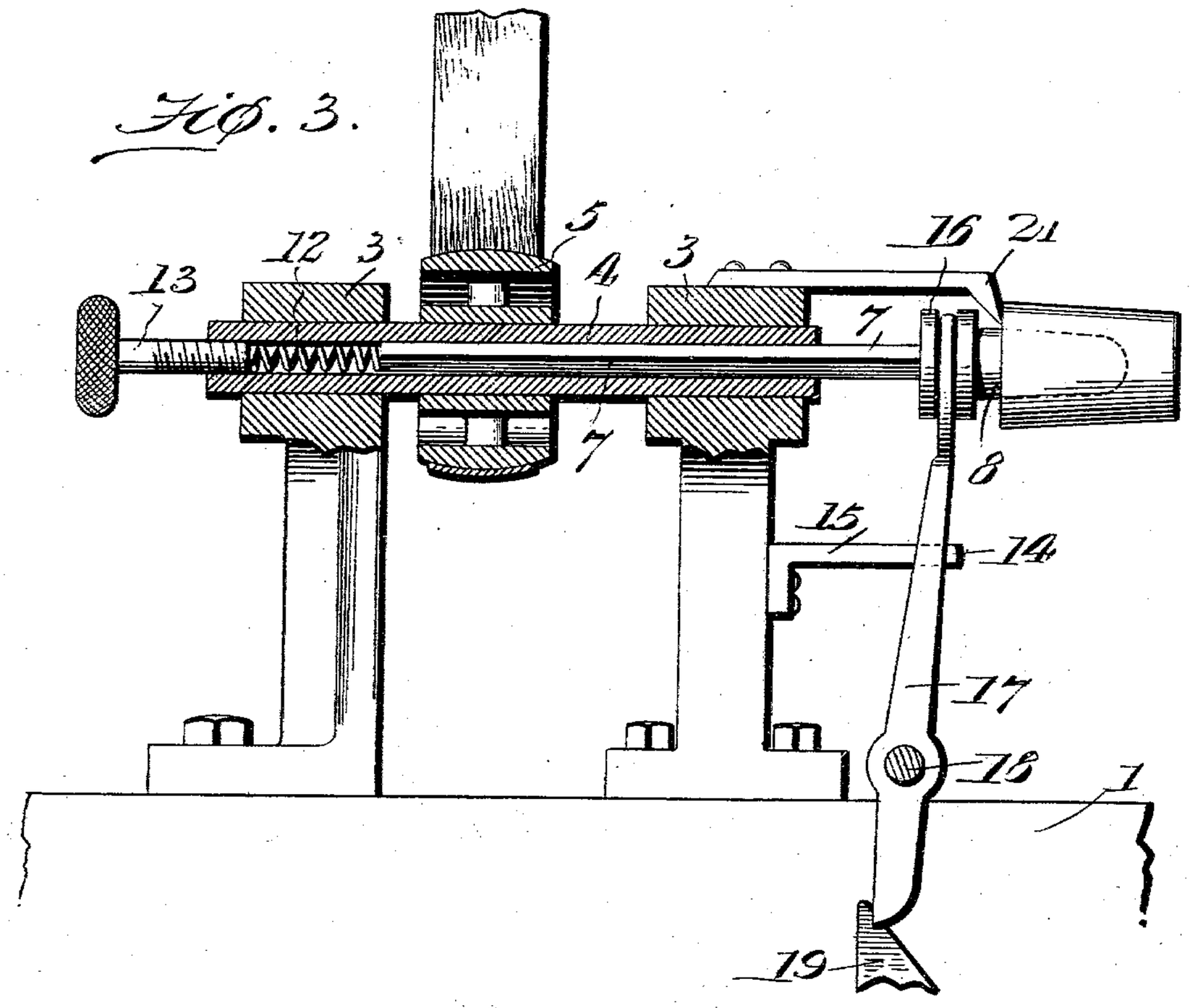


Fig. 4.

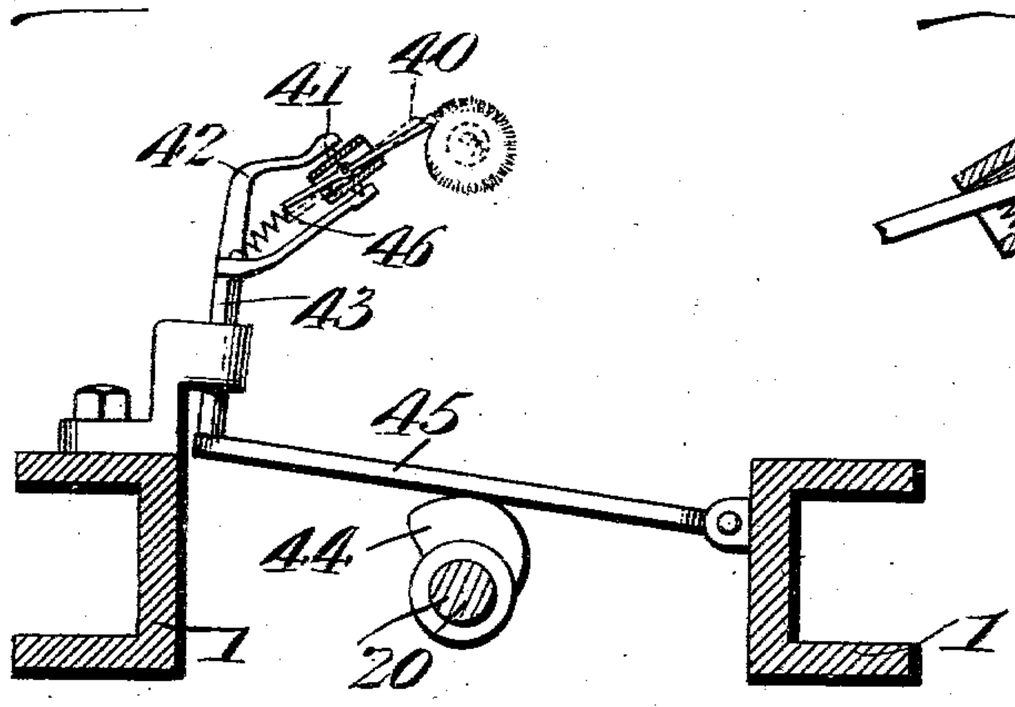
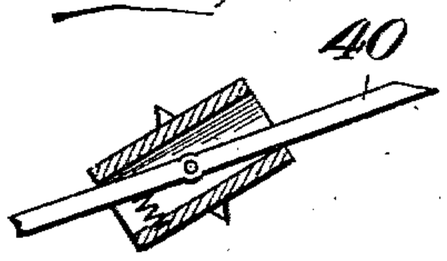


Fig. 10.



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NO MODEL. 4 SHEETS—SHEET 4.

FIG. 7.

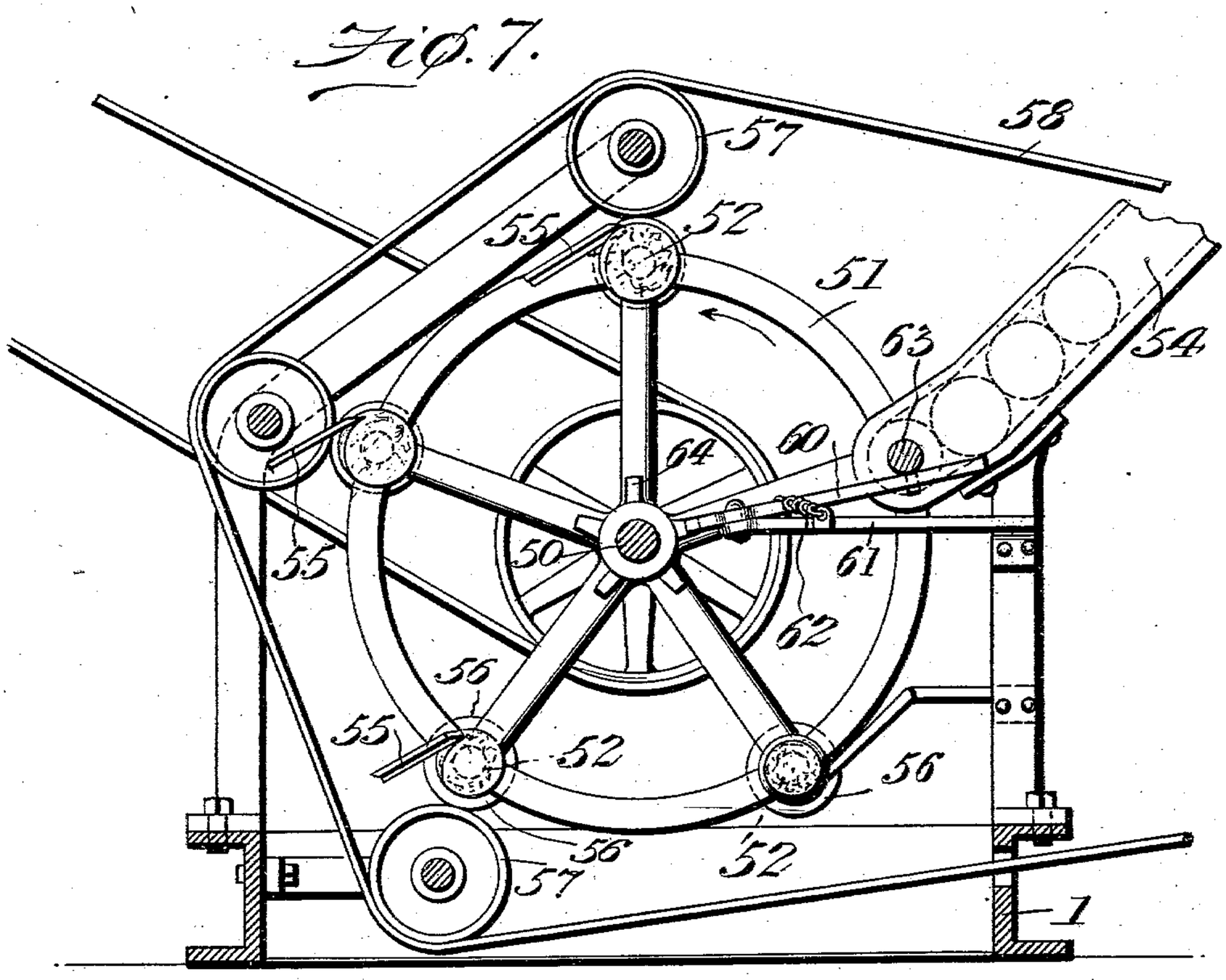


FIG. 8.

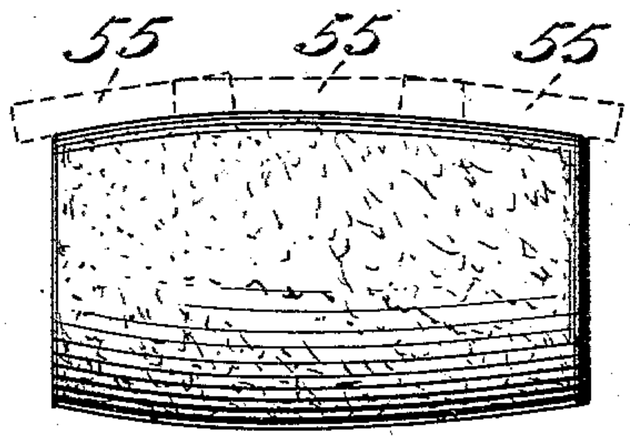
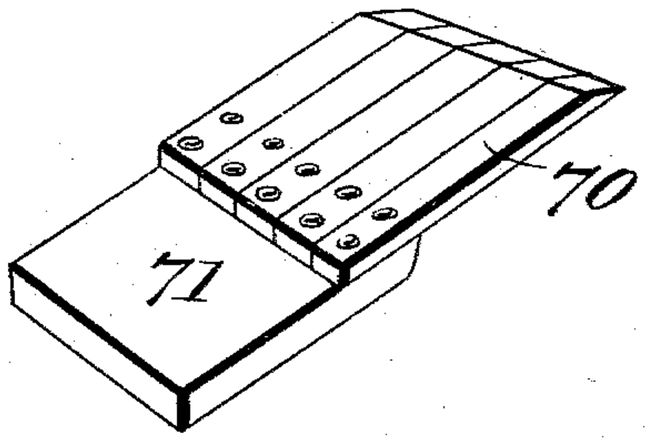


FIG. 9.



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No. 743,587. Patented November 10, 1903.

UNITED STATES PATENT OFFICE.

CHARLES O. STRUTZ, OF WASHINGTON, MISSOURI.

MACHINE FOR TURNING CORNCOB PIPES.

SPECIFICATION forming part of Letters Patent No. 743,587, dated November 10, 1903.

Application filed June 5, 1903. Serial No. 160,251. (No model.)

To all whom it may concern:

Be it known that I, CHARLES O. STRUTZ, a citizen of the United States, residing at Washington, in the county of Franklin and State of Missouri, have invented a new and useful Machine for Turning Corncob Pipes, of which the following is a specification.

The object of this invention is to provide a machine for turning corncob pipes.

At the present time corncob pipes are made exclusively by hand, the turning operation being accomplished on an ordinary form of lathe. The corncobs are first sawed into proper length and then bored out to form a tobacco-well, after which they are placed one by one on a mandrel or head-stock and turned down by means of a tool held in the hands of the workman. The turning operation is for the purpose of removing the furry and softer portions of the cob, the turning operation being complete when the hard wood is reached.

The character of corncobs varies with the species, soil, and climatic conditions, and it has been found impossible to provide a product of such uniform size as would permit its manipulation by a machine-tool, the varying character of the cob necessitating the employment of skilled labor and the treatment varying with the size and nature of the cob.

It has been found that corncobs grown in one section of this country are especially adapted for the manufacture of pipes, possessing peculiar qualifications, in that, differing from the cobs of most varieties of corn, the cobs possess an outer ring of wood of sufficient thickness to permit the manufacture of pipes on a commercial scale. In the manipulation of these cobs it is necessary first to cut the cobs into proper lengths for the formation of a pipe and afterward to bore and then turn the pipes to remove the so-called "furry" matter which surrounds the wood or fiber. The cobs are of different diameter, of different length, the peripheral coating of furry matter is variable in thickness, the pith, the fibrous ring, and the outer coating are seldom concentric, and it has heretofore been found impossible to manufacture pipes by machinery.

The principal difficulty attendant to the use of a machine is that a machine will produce a pipe of uniform size without regard to the character of the cob, and while the turning operation should be complete when the soft or furry outer layer is removed a machine will either remove only a portion of the outer layer in the case of a small cob, or in a large cob will remove not only the furry material, but a portion or all of the woody matter from which the pipe is formed. Aside from this the variation in concentricity of the pith and the woody fiber renders it exceedingly difficult to manipulate the blanks in such manner as to permit manufacture by machinery. In carrying out the present invention a machine is employed for accomplishing this turning operation automatically, the cob lengths being fed to the machine in quantity and placed automatically on the mandrel or head-stock and then subjected to the action of a cutting knife or knives, so arranged and disposed as to follow hand-work, in that when the hard or woody substance is reached the cutting operation will cease, the result being a pipe which needs only the further filling and shellacking operations to render it a complete article of commerce.

A still further object of the invention is to provide an automatic machine in which pipe lengths will be fed automatically to the mandrel or head-stock and stripped therefrom after the completion of the turning operation.

A still further object of the invention is to provide a cutting-knife which will yield in accordance with the quality and conformation of the cob length or blank, and thus effect the production of an article similar to that resulting from hand-turning.

A still further object of the invention is to provide a cutting-knife in which the depth of cut is regulated solely by the degree of penetrability of the material being acted upon, the cutting operation ceasing as soon as the knife-edge comes into contact with the hard woody fiber immediately below the comparatively soft furry outer layer of the cob.

With these and other objects in view, as will hereinafter more fully appear, the invention consists in the novel construction and arrangement of parts hereinafter described, illustrated in the accompanying drawings, and particularly pointed out in the appended claims, it being understood that va-

rious changes in the form, proportions, size, and minor details of the structure may be made without departing from the spirit or sacrificing any of the advantages of the invention.

In the accompanying drawings, Figure 1 is a front elevation of a corncob-pipe-turning machine constructed in accordance with the invention. Fig. 2 is a transverse sectional elevation of a portion of the same, illustrating more particularly the construction of the feed-chute and the mechanism for raising successive cob lengths into alinement with the mandrel or head-stock. Fig. 3 is a longitudinally-sectional elevation of a portion of the machine, illustrating the mandrel or head-stock mounting. Fig. 4 is a view similar to Fig. 2, showing the mounting of the cutting-knife. Fig. 5 is a detail view of the form of mandrel or head-stock which it is preferred to employ. Fig. 6 illustrates the arrangement of the cams, which act successively to force the various parts of the machine into operation. Fig. 7 is an elevation, partly in section, of an automatic lathe having a plurality of mandrels for receiving the pipe-blanks. Fig. 8 is a detail view showing in dotted lines one position which the cutting-knife may assume in following the contour of a pipe-blank. Fig. 9 is a detail perspective view of a preferred form of cutter. Fig. 10 is a transverse sectional elevation illustrating a cutting-knife and cutting-knife support detached from the machine.

Similar numerals of reference are employed to indicate corresponding parts throughout the several figures of the drawings.

The working parts of the apparatus are supported on a suitable framework 1, comprising a bed-plate, which may be of a character similar to that used in the ordinary form of lathe or machine tools of like class. On the bed-plate are secured bearing-blocks 3 for the reception of a spindle 4, having a belt-pulley 5, to which motion is imparted by any suitable source of power. This spindle is hollow, being provided with an annular or non-circular bore to receive the shank 7 of a mandrel or head-stock 8, the mandrel being of proper diameter to enter the previously-bored cob lengths and rotating said cob lengths in order to present the same to the action of a cutting-knife. The cob lengths being bored by the same machine are as a rule provided with tobacco-wells of the same diameter, but this diameter is variable, owing to the lack of concentricity of the pith and the diameter of the pith, so that a mandrel of a standard diameter would not in all cases hold the pipes sufficiently firm to turn them against the action of the cutter. To overcome this difficulty, it has been found best to employ an expansible mandrel of the character shown in Fig. 5, said mandrel being formed of a plurality of spring-arms 9 in the form of loops, the ends of which are secured to a disk or head-piece 10, the arms yielding in order to accommodate cob lengths of different bore. The head-stocks are normally held in proper position by a spring 12, arranged in the bore of the spindle, the stress of the spring being adjusted by a screw 13 and the limit of outward movement being fixed by a lug 14, arranged at the end of a bar 15. Secured to or forming a part of the mandrel is a grooved collar 16, with which engages the bifurcated end of a lever 17, fulcrumed on a pin 18, the lower end of said lever being engaged by a cam 19 on a shaft 20, adapted to suitable bearings in the frame. This cam serves at the end of a turning operation to effect the discharge of a turned cob from the mandrel, the stripping operation being effected by a finger 21, extending from one of the spindle-bearings and engaging against the end of the pipe, so that when the mandrel is retracted the turned pipe will be returned in its initial position, and thus discharged from the mandrel. This operation may of course be accomplished by any of the strippers ordinarily employed in automatic lathes for the discharge of finished articles, and the mandrel may remain stationary while the stripping-finger moves.

The cam-shaft 20 is arranged slightly below the bed-plate and is provided with a gear 23, intermeshing with a pinion 24, which may be driven by means of a suitable belt-wheel 25. This cam-shaft carries a number of cams which are relied upon to force the various operative portions of the mechanism into position at the proper time.

The previously-cut lengths of cob are fed to a chute 27, inclined at such angle as to allow the cobs to travel freely downward in the direction of the mandrel or head-stock. The chute 27 terminates in a box or casing 28 and the bottom of which is formed by a plunger 29, and the parts are of such size and so related that only a single pipe-blank or cob length may rest on the plunger 29, the remaining lengths being retained in the chute. The axial line of the cob length resting on the plunger is below the axial line of the head-stock, and in order that the tool may be placed in proper relation for the feeding of the cob length to the mandrel a cam 30 is secured to the cam-shaft and operates on a pendent pin or stud carried by the plunger, serving at each rotation of the cam-shaft to elevate the cob lengths carried by the plunger to a position in alinement with the mandrel. At this movement one side of the plunger engages with the next lowermost pipe of the chute and forces the same upward, preventing the passage of a second length to the plunger, and it is only when the plunger reassumes the lowest position that the second cob length can fall into place. When the cob length is elevated by the plunger, it becomes necessary to force the same to position on the mandrel, and for this purpose there is employed a disk 32, carried by or forming part of a pin 33 and constituting a tail-stock. The pin rotates

freely on a spindle 34, adapted to suitable bearings in standards 35 and movable longitudinally in order to force the cob length onto the mandrel, and as the mandrel is rotated rapidly during the feeding of the cob length the disk and its carrying-pin are allowed to rotate freely in order to prevent injury to the bottom of the pipe. The spindle 34 is provided with a pendent arm 36, which is engaged by a cam 37 on cam-shaft 20 at each rotation of the latter, the parts being so timed as to force the cob length into position on the mandrel immediately after the cam 30 has operated to raise the plunger.

The cutting-knife is in the form of a blade or number of blades 40, hung on gimbals, as indicated at 41, and carried by a vertically-movable frame 42, supported on a stud 43, extending through a suitable guiding-opening in a bracket carried by the frame. The cutting-knife is elevated to operative position by means of a cam 44 on the cam-shaft 20, said cam engaging a lever 45, which is connected to and moves with a knife-carrying frame. The knife is hung freely and is held in proper position by means of springs 46, and the cutting operation differs from the ordinary turning of either wood or metals in that it is to some extent in the nature of a shearing operation, the knife being arranged tangentially to the cob length, so that the soft furry outer surface of the cob may be removed without danger of breakage. Under ordinary conditions the contact of a cutting or other tool with a cob length at an angle other than tangentially or at such an angle as is ordinarily practiced in the turning of wood or metals would result in breakage of the cob or chattering to such an extent as to prevent the production of a pipe having a smooth outer surface. The cutting operation is completed when all of the soft or furry matter has been removed from the corncob, and if the operation is carried on too long more or less of the hard woody matter will be removed from the cob and the value of the pipe impaired to a corresponding extent, or if the cutting operation is not carried on to a sufficient extent more or less of the furry matter will remain, and it becomes impossible to properly finish the outer surface of the pipe.

In carrying out the present invention the springs are arranged in the manner shown and serve to hold the knife in proper position and at the same time to permit the necessary yielding movement when the resistance to the cutting action becomes so great as to cause the knife to move away from the cob or to cease its cutting action, this occurring after the soft furry outer surface has been removed and the knife comes into contact with the wood. The knife is mounted tangential with respect to the revolving pipe-blank and is movable toward the line of lathe-centers in a direction substantially radial of such line, while the springs are properly adjusted in order to prevent any cutting action of the knife after the edge comes into contact with the hard woody fiber immediately under the soft outer surface. In this manner the depth of cut is controlled solely by the degree of penetrability of the material being acted upon. As the knife is inclined at an angle greater than that of the angular line of the resultant pipe, a portion of the knife-blade will come into action first at the base or bottom of the pipe and will continue gradually to cut until the opposite end of the cob-section has been reached. The action of the cam 44 serves to gradually bring the knife into play, so that the whole surface of the cob will not at the same time be subjected to the action of the knife. When the resistance to the cutting action has increased to such an extent as to force back the knife, or rather to prevent its further cutting action, the turning operation is completed and the finished article is discharged from the mandrel by the stripper-cam 19. Should the knife meet with resistance near the base or bottom of the cob-section, one of the springs will yield and permit slight rocking movement, while the remaining portion of the knife-edge will still be held in contact with the surface of the cob and complete the cutting operation.

The cutting operation may be carried on in a number of ways, as by the employment of an automatic lathe of suitable construction and the employment of a number of knives adapted to operate on the cob at different points to effect the cutting operation in a gradual manner without danger of breakage of the cob. A lathe of this character is illustrated in Fig. 7, the view being partly in the nature of a diagram in order to illustrate the operation more clearly and the parts here shown being of a character similar to that employed in automatic lathes for turning various small articles. A central shaft 50, mounted in suitable bearings, carries a spider or disk 51, to which is secured a number of mandrels 52, adapted for the reception of the cob lengths to be turned. The blanks or cob lengths are fed through a chute 54 to a position in alinement with the plane of movement of the mandrels, and the operating mechanism serves to force such cob lengths into position. This mechanism may be of the same character as that previously described or of the ordinary character employed in connection with automatic lathes. The mandrel-carrying spider or disk receives rotative movement at a comparatively slow speed and is turned until the cob lengths engage successively with a series of cutting-knives 55, which are adapted to act on different portions of the blank, preferably in the manner illustrated in Fig. 8, the cuts overlapping in order to insure the removal of all portions of the soft or furry coating of the cob. The several mandrels are provided with friction-disks 56, which are engaged by friction-disks 57 when the pipes are being oper-

ated upon by the cutters, and the friction-disks 57 are driven by a belt 58 from any suitable source of power. In placing the pipe lengths on the mandrels with this form of automatic lathe it is preferred to employ a lever 60, pivoted to a bracket 61 and normally held in attracted position by a spring 62. One end of the lever is arranged adjacent to the lower end of the cam-chute 54 and operates on a plunger 63, the plunger extending through the side of the chute and engaging the bottoms of the pipes. The opposite end of lever 60 is engaged by a series of cams 64, secured to the shaft 50 and movable in such manner as to effect a rocking movement of lever 60 and the forcing of a cob length into position on the mandrel as the latter passes the chute.

In an automatic machine of this character which must be driven at a comparatively high speed it is desirable that the cutting operation be carried on without danger of breaking the pipes, and for this purpose it is preferred that the knives act successively at different points in the length of the cob, a portion only being operated at one time, although in some cases, especially where the cobs are of uniform or nearly uniform size, the knives may act successively over the whole length of the cob and gradually cut deeper and deeper into the furry peripheral coating of the cob. In some cases it is found that the knife will leave the cob prematurely, owing to the presence of a hardened portion of the woody fiber near one end of the cob length, and to avoid this the knife may be formed in a number of independently-yieldable sections. These knife-sections 70 are secured independently to a supporting-base 71 and will permit a considerable range of independent movement should the corncob be irregular.

Having thus described the invention, what is claimed is—

1. A lathe comprising centers and a tangentially-mounted cutting-knife free to be controlled as to depth of cut solely by the penetrability of the material, and means for yieldably impelling it subject to such control toward the line of lathe-centers, substantially radial of said line.

2. In a machine for turning corncob pipes, a tangentially-mounted cutter free to be controlled as to depth of cut solely by the degree of penetrability of the cob, and a yieldable means for moving the cutter in a line approximately radial of the axis of the cob-support.

3. In a machine of the class described, a revoluble mandrel, a cutter in which the extent of cut is controllable solely by the degree of penetrability of the work, and a yieldable means for impelling the cutter in the direction of the work, said cutter being free to yieldably move in a direction substantially radial of the axis of the mandrel and in a direction parallel therewith.

4. In a machine for turning corncob pipes, a knife, gimbals on which the knife is hung, and springs serving to hold the knife in engagement with the cob, said springs serving to permit yielding movement of the knife in a direction substantially radial of the axis of rotation of the cob and in a direction parallel therewith.

5. In a machine for turning corncob pipes, means for supporting and rotating the cob-blanks, a cutting-knife, gimbals forming a pivotal and freely-movable support for the knife, and springs tending to hold the knife in engagement with the cob, said springs serving to permit yielding movement of the knife in a direction substantially radial of the axis of rotation of the cob and in a direction parallel therewith.

6. In a machine of the class described, a cutting-knife formed of a plurality of independently-yieldable members to permit the knife to follow the variable contour of the cobs, the several members presenting a practically-continuous cutting edge.

7. In a machine for turning corncob pipes, a yieldably-mounted cutter-support, and a cutter carried thereby, said cutter being formed of a plurality of independently-yieldable members presenting a practically-continuous cutting edge that will vary in accordance with the variation in density of the cob.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CHARLES O. STRUTZ.

Witnesses:
JNO. E. PARKER,
J. ROSS COLHOUN.